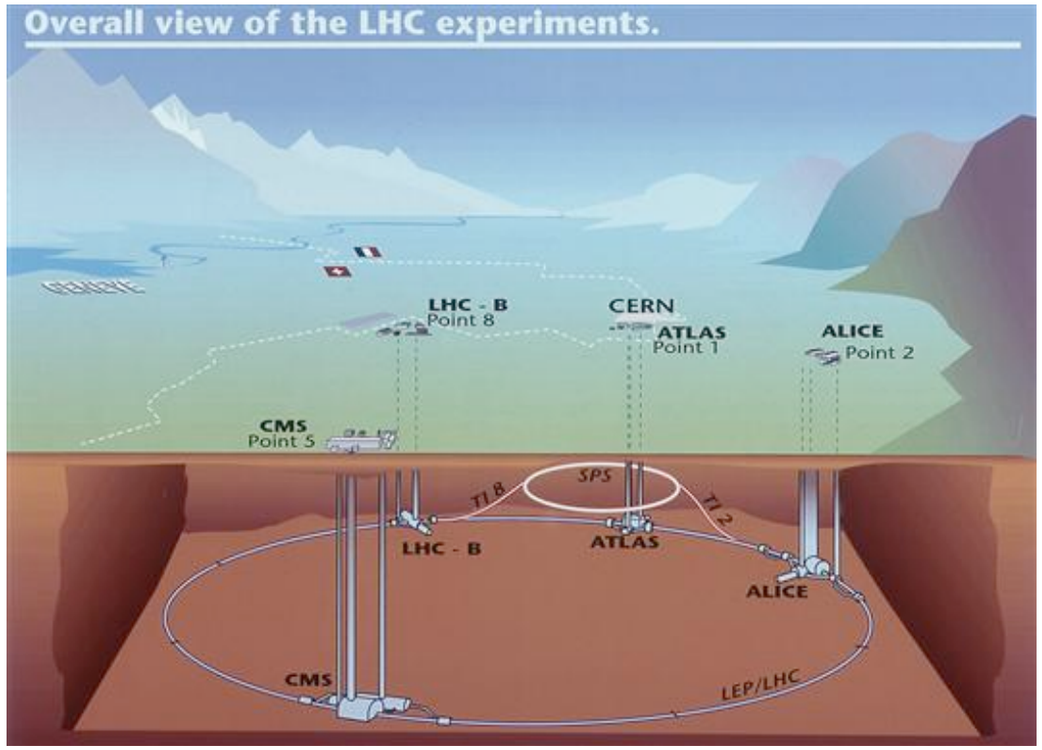
LHC and CMS Status

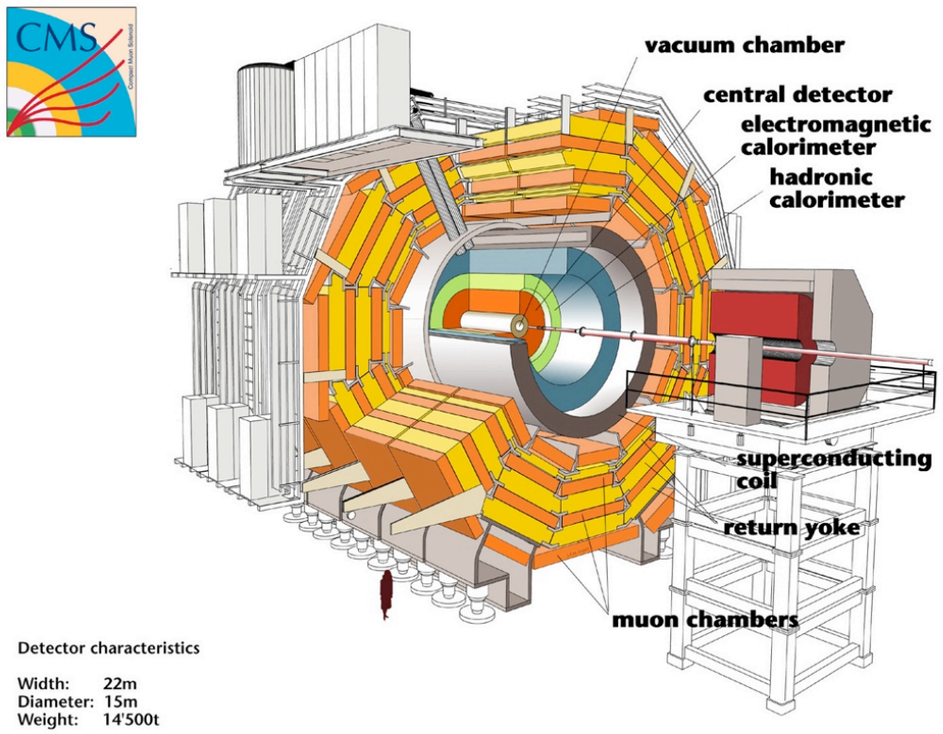
Fermilab All Experimenters Meeting
12/01/08

Oliver Gutsche - CMS Center

Outline

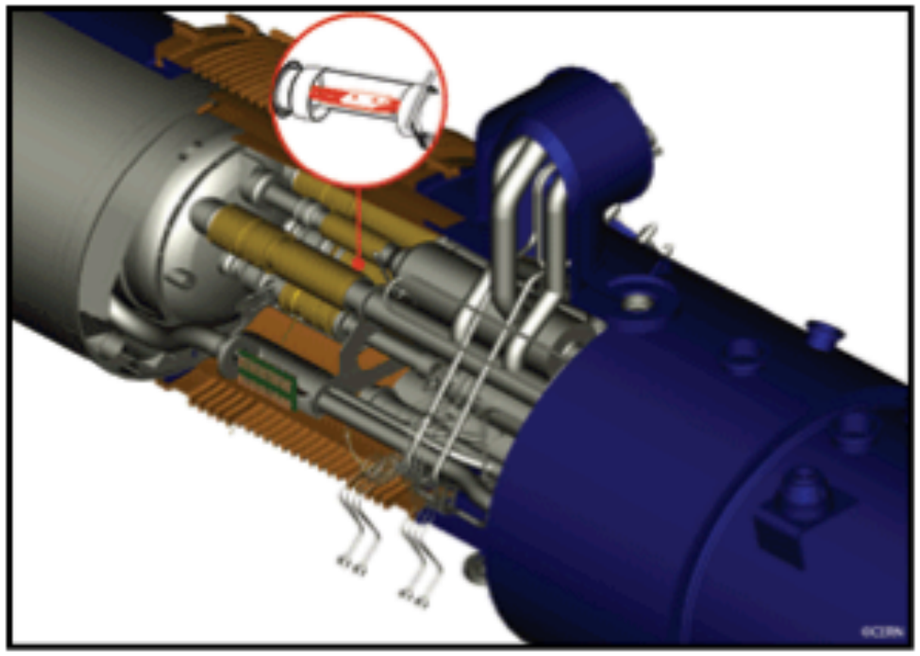
- LHC status
- CMS status
- CRAFT
- Outlook





LHC Incident

- Operation of the LHC was shutdown on Sep. 19
  - On Oct. 16 CERN released an analysis of the incident (hyperlink).
  - "A faulty electrical connection between two magnets was the cause."



- Some details
  - Splice warmed above critical T, connection melted, and an arc formed.
  - Vacuum vessel ruptured, helium vaporized & escaped with large force.
  - Magnets moved, sometimes breaking loose from concrete anchors.
  - "The number of magnets to be repaired is at most 5 quadrupoles and 24 dipoles." is a quote from the report.

Robert Harris, Fermilab 3

LHC status

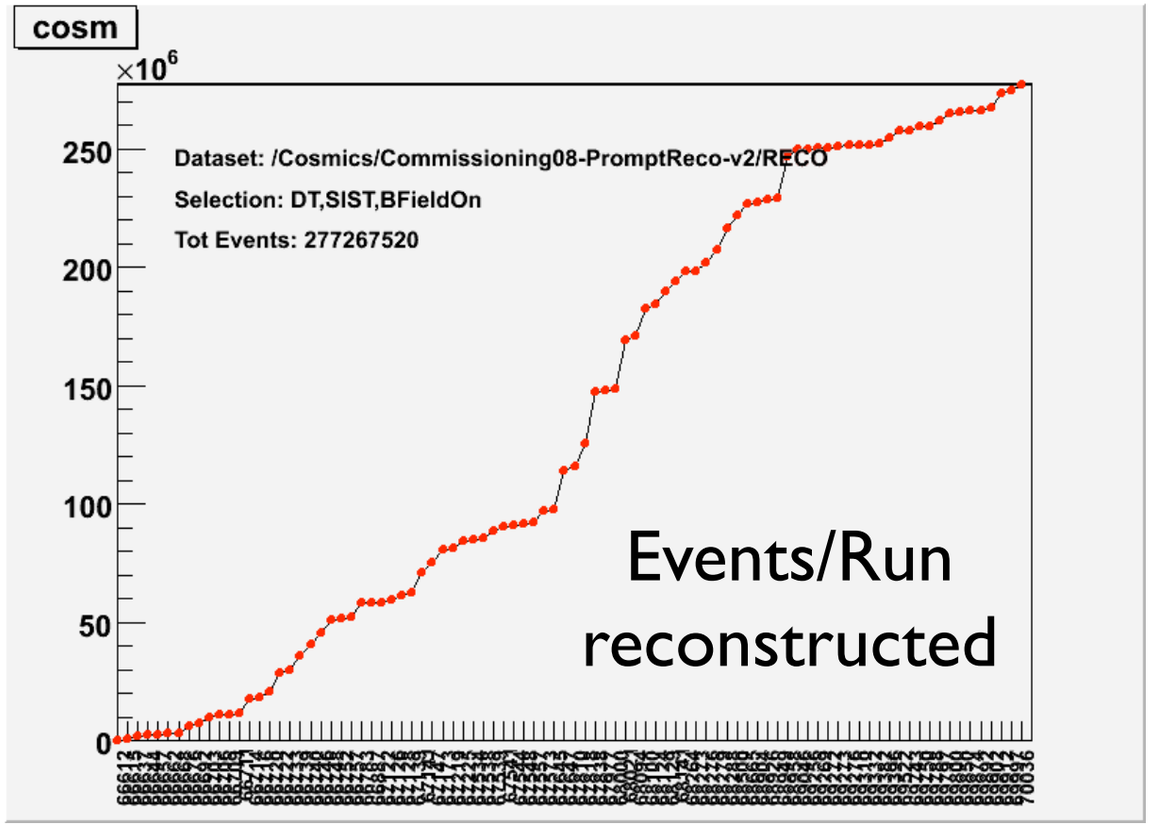
- Meeting about LHC schedule from 11/25/08:
  - A lot of progress in developing diagnostic procedures and tools to make sure that no other bad splices are 'hidden' in the machine
  - Moving out magnets affected by the incident has started:
    - Foreseen to remove 39 dipoles, including 6 (3 at each side) in a buffer zone.
    - All magnets to be brought to the surface should be out before the Christmas shutdown.
    - By then 20 dipoles should already be back in the machine.
    - The test bench (for cold testing) is a limiting factor. Capacity to be ramped up after connection of 18 kW plant (now 6 kW) in February 2009.
  - Schedule (still subject to changes):
    - Last magnet should be back in end of March 2009
    - Whole machine cold again beginning of July 2009.
    - Meaning optimistically first beam in the machine end of July.

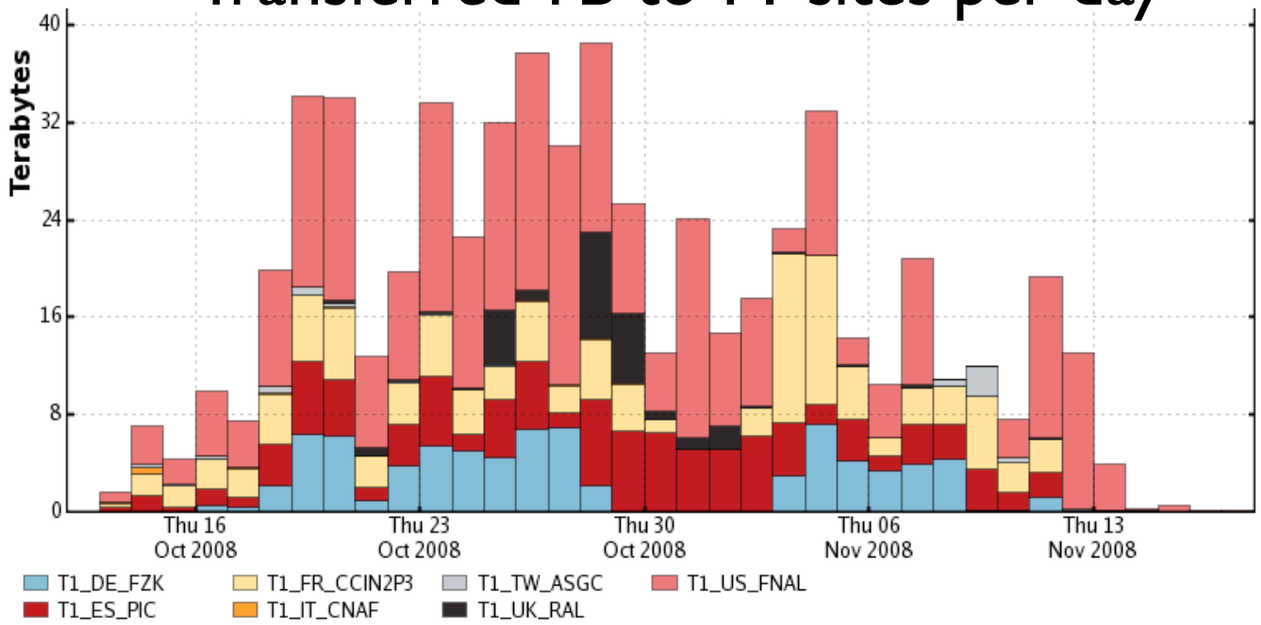
CMS status

- CMS detector complete (except Preshower and Castor at (-z))
- 4 week Cosmics Commissioning Run at Full Tesla Magnetic Field (CRAFT) ended 11/11/08
- Since 11/12/08: Shutdown for Commissioning completion and Maintenance
  - Started opening the detector: 11/17/08
    - De-classify cavern as controlled radiation area
  - Pre-Shower installation Feb./March '09
    - Waiting for detector and tooling
  - Close the detector and have it operational: 5/15/09
    - Planning based on LHC schedule from beginning of Nov. '08
- A lot of work ahead completing the commissioning, improving on what was found during CRAFT and bringing the detector to achieve required 2009 performance

CRAFT

- Continuous Cosmics data taking from Oct. 17 to Nov. 11 with the complete detector
- Collected over 355 Million Cosmics events ready for analysis
  - 277 Million events with magnetic field on
- Gained valuable lessons not only about the detector
  - Also the computing infrastructure was used extensively to reconstruct the taken Cosmics at the T0 and distribute it to the T1 centers





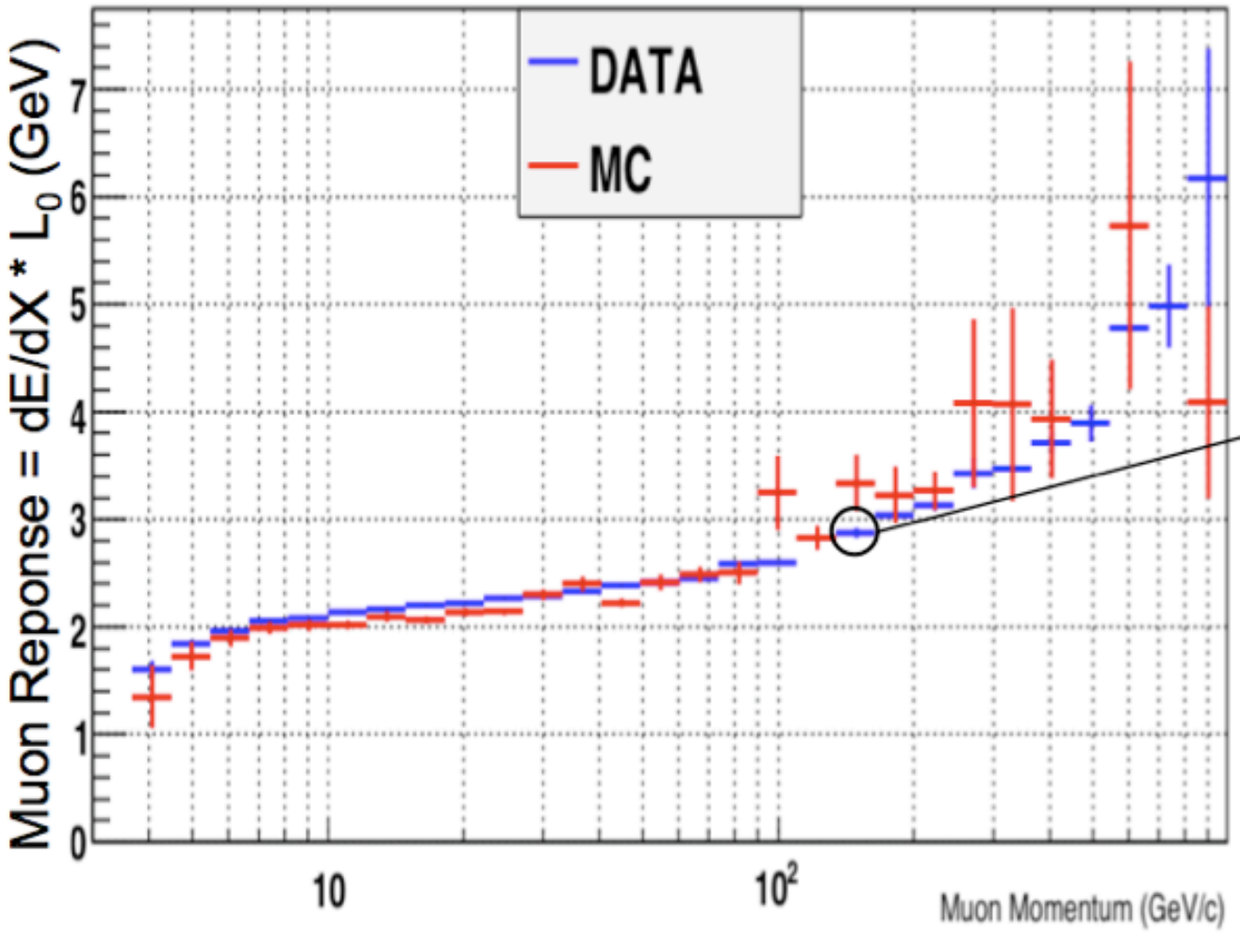
Analysis of Cosmics events (HCAL)

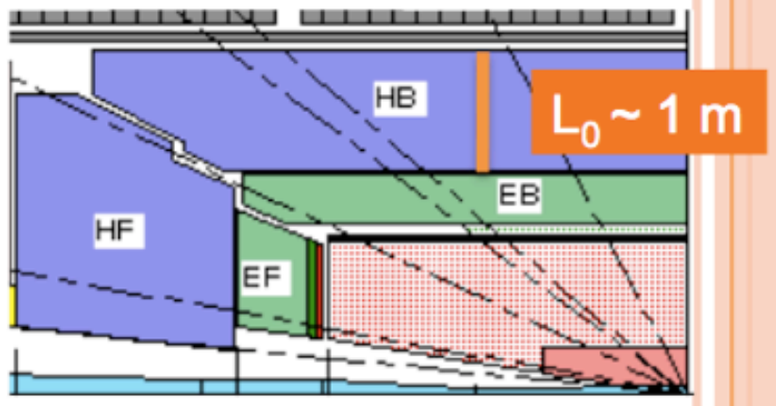
Muon Response in Barrel Hadron-Calorimeter

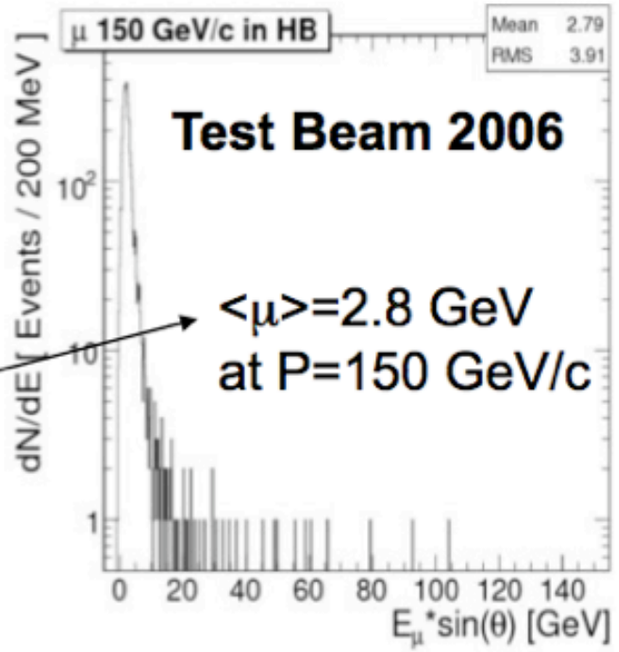
Muon Reponse = $\mu = dE/dX * L_0$ (GeV)

energy deposited In HB towers

calculated using the path length of the reconstructed muon track







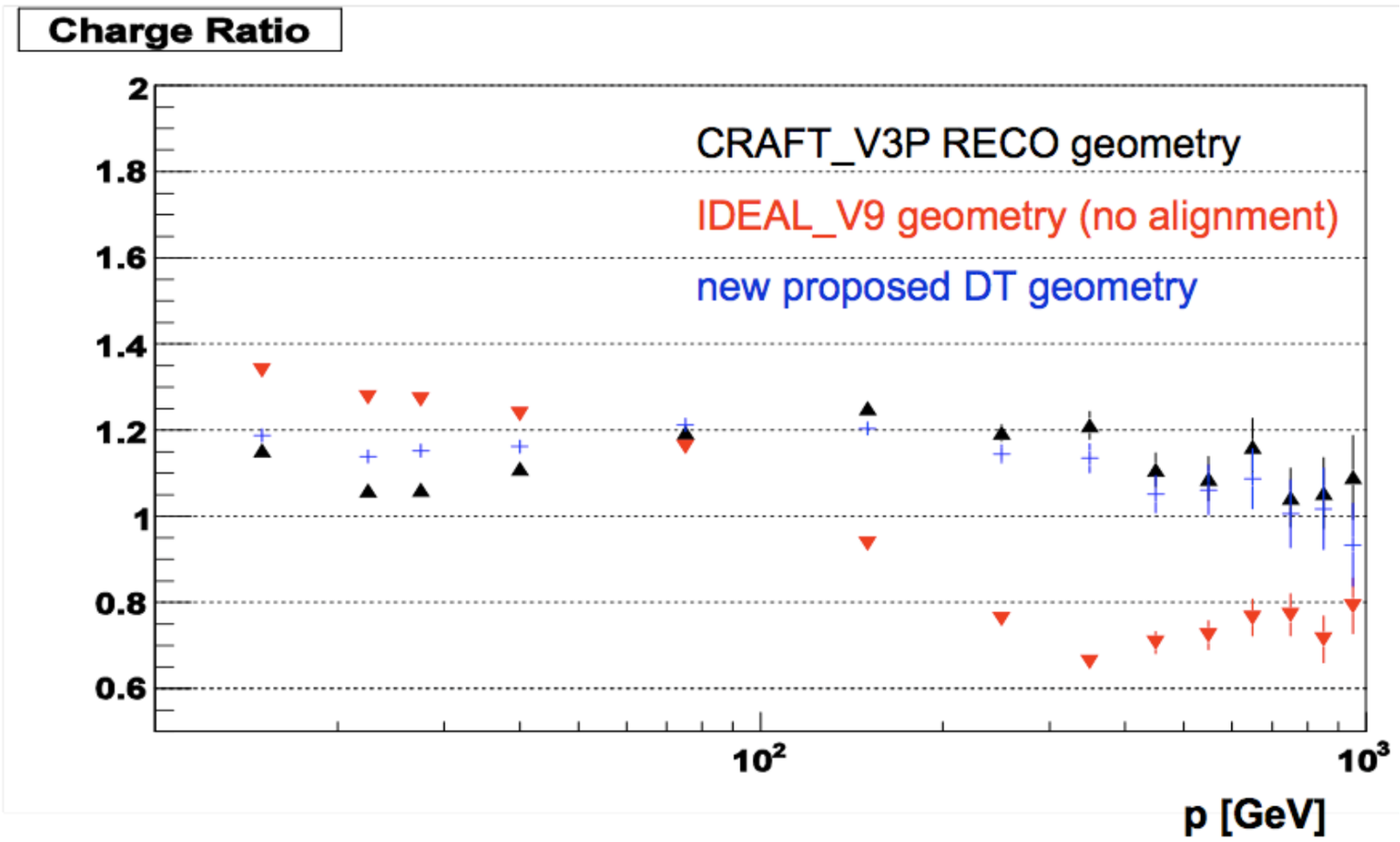
Almost perfect match with Test Beam 06 data!

- Small discrepancies with MC under Investigation

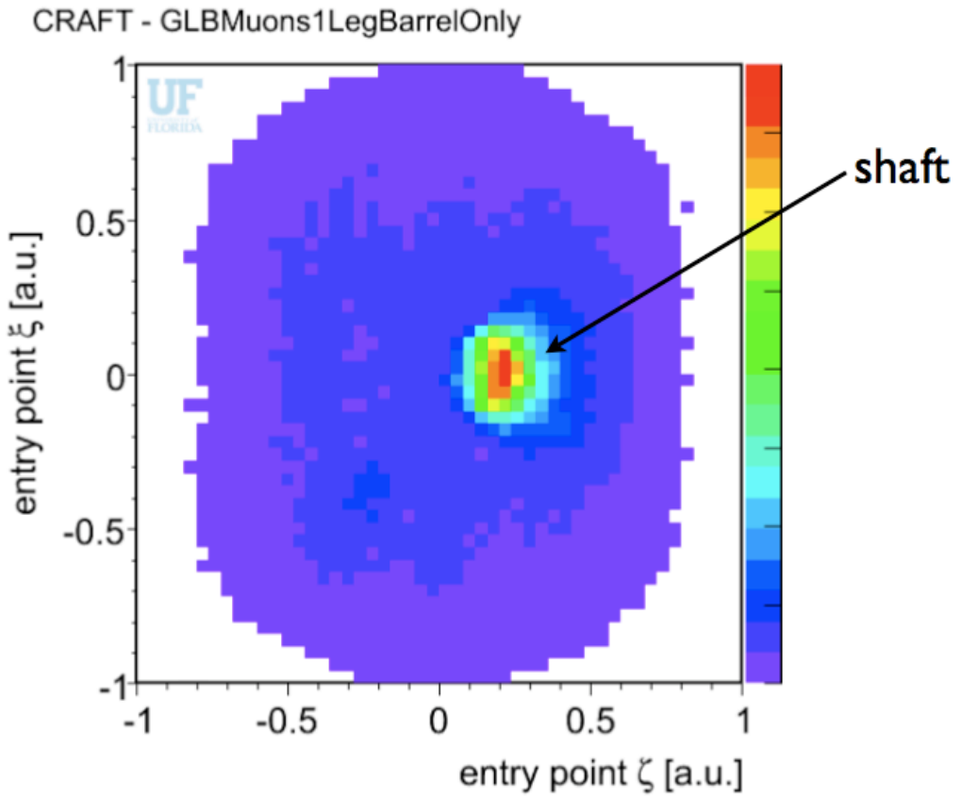
11/14/08 Francesco Santanastasio - University of Maryland 7

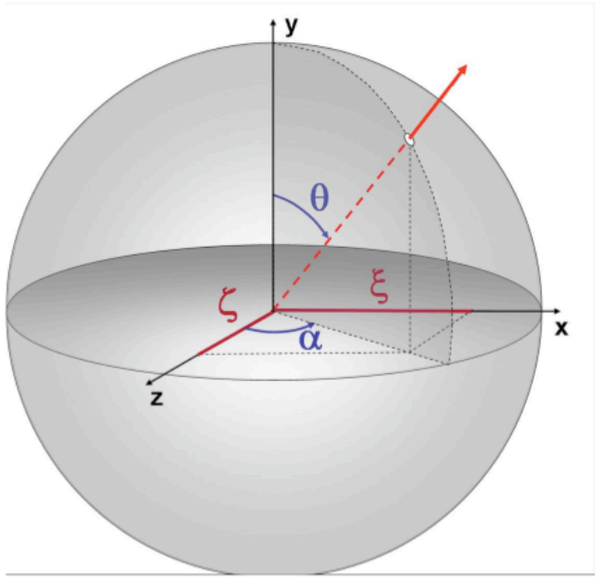
Analysis of Cosmics events (Muons)

- A lot to learn about alignment of the different sub detectors
- Extraction of cosmics measurements:
  - Charge ratio for subset of CRAFT runs with different alignments



Angular distribution in XZ

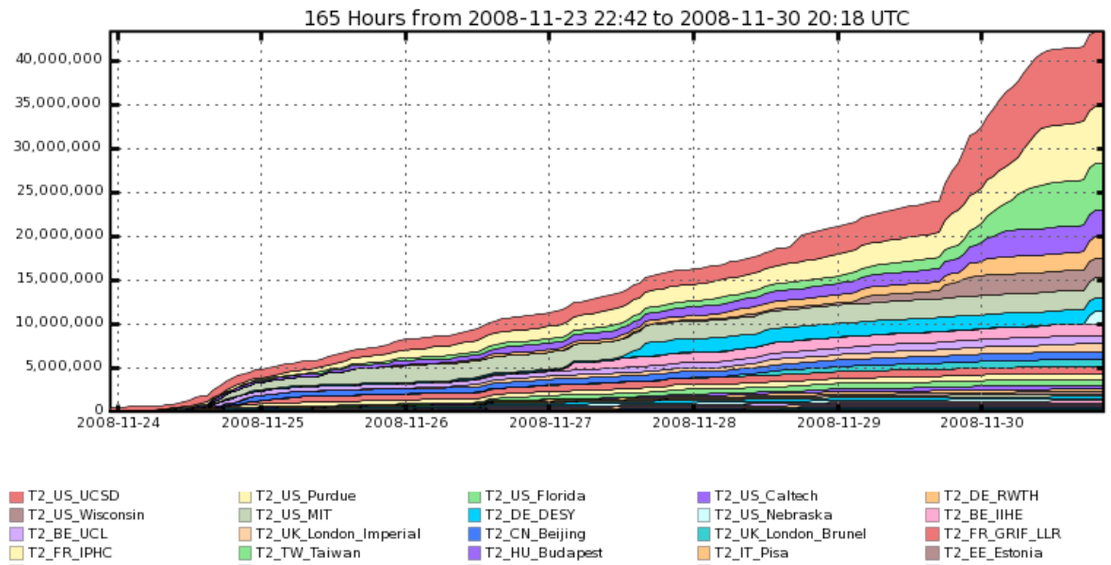




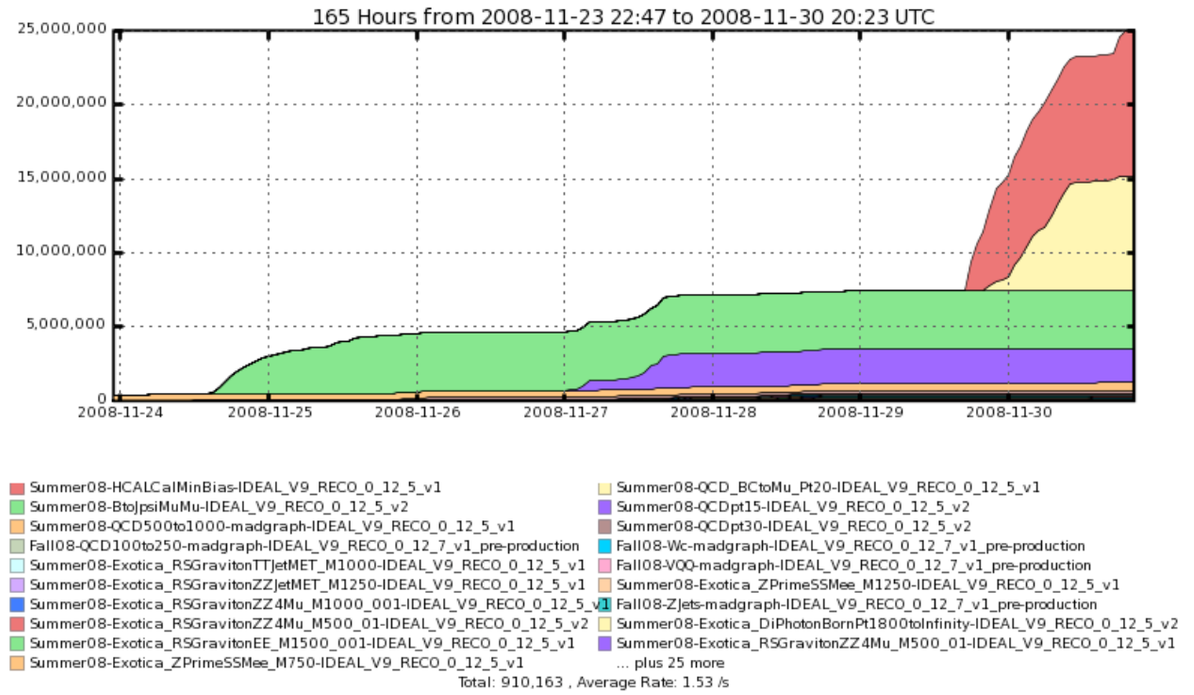
Outlook

- We are eagerly awaiting 2009 where we will get beam
- Much learned during the last cosmics data taking periods
- We would have been ready for data taking this year. Now, we have to concentrate on finalizing and improving the detector, online and offline systems incorporating all that we learned.
- Analyze Cosmics data and continue to learn as much as we can about the detector
  - Several re-processing's of the Cosmics data are planned, currently we are re-reconstructing cosmics data on the T1 sites (including FNAL)
- Prepare and refine startup physics analyses with dedicated MC studies
  - Produce a lot of MC
    - ~25 Million events per week

Simulated and Reconstructed MC events for the last week



Reconstructed MC events for the last week



The end